



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/771,403	01/26/2001	Robert Hundt	10005458-1	6325

7590 06/15/2004
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

ROCHE, TRENTON J

ART UNIT	PAPER NUMBER
----------	--------------

2124

4

DATE MAILED: 06/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/771,403

Applicant(s)

HUNDT ET AL.

Examiner

Trent J Roche

Art Unit

2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2124

DETAILED ACTION

1. This office action is responsive to Amendment A filed 26 March 2004.
2. Per applicant's request, new claims 11-16 have been entered. Claims 1-16 are now pending.
3. Claims 1-16 have been examined. The prior rejection as utilized in the previous office action is reproduced herein, with modifications to clarify various issues raised in the applicant's remarks.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Poor Man's Watchpoints by Copperman et al, hereafter referred to as PMW.

Regarding claim 1:

PMW teaches:

- a method for allowing debugging capability in code instrumentation (“supplying an interface to the instrumentation in the debugger...” on page 37)
- that takes a block of original code to produce a block of instrumented code (“replacing each store and/or load instructions with an inline check or call to a function...” on page 37)
- providing an instrumentation breakpoint in the block of original code (“a call to `_do_watch` is patched into the executable prior to each memory access.” on page 38. The instrumentation breakpoint is what causes the `_do_watch` function to be patched.)

Art Unit: 2124

- generating the block of instrumented code (“replacing each store and/or load instructions with an inline check or call to a function...” on page 37. The patch generates the instrumentation code into the program.)
- running the block of instrumented code until a debugging breakpoint is reached (“replacing each store and/or load instructions with an inline check or call to a function that gives control to the debugger if the accessed location is being watched...” on page 37. As the location is being watched, and the control is passed to the debugger, a debugging breakpoint is inherently reached.)
- performing debugging functions on the block of instrumented code (“On receiving a watchpoint command, the debugger has to add an entry to the watch table...” on page 40)

as claimed.

Regarding claim 2:

The rejection of claim 1 is incorporated, and further, PMW teaches replacing a first instruction as claimed (“a call to `_do_watch` is patched into the executable prior to each memory access.” on page 38. The instrumentation breakpoint is what causes the patching, and it would inherently replace a first instruction. Not replacing the instruction would cause the instruction to execute twice, once in the patched version, and once in the non-patched version, resulting in the extra execution of an instruction and an error in program operation.

Regarding claim 3:

Art Unit: 2124

The rejection of claim 2 is incorporated, and further, PMW teaches a first instruction comprising one or more instructions as claimed (“insert a patch prior to each watchpoint patch target, that is, each store and/or load...” on page 38)

Regarding claim 4:

The rejection of claim 2 is incorporated, and further, PMW teaches restoring the first instruction as claimed (“the previous contents of that register and the return-address register must be saved and restored” on page 38)

Regarding claim 5:

The rejection of claim 1 is incorporated, and further PMW teaches providing a debugging breakpoint as claimed (“We allocate one breakpoint structure, wp_bp, at debugger initialization time...” on page 40)

Regarding claims 6-10:

Claims 6-10 are directed to a computer-readable medium embodying instructions for performing the methods of claims 1-5, and are rejected for the reasons set forth in connection with claims 1-5.

Regarding claim 11:

The rejection of claim 2 is incorporated, and further, PMW discloses a first debugging breakpoint and the first instruction being a second debugging breakpoint as claimed (“every watchpoint that is hit by _do_watch causes a breakpoint to be reached...” on page 40. Further, since “A call to _do_watch is patched into the executable prior to each memory access” (page 38), and the patching

Art Unit: 2124

occurs when the instrumentation breakpoint is reached, then the first instruction replaced by the instrumentation breakpoint inherently becomes a second debugging breakpoint, as every `_do_watch` call causes a breakpoint to be reached.)

Regarding claim 12:

The rejection of claim 1 is incorporated, and further, PMW discloses a first debugging breakpoint and the instrumentation breakpoint being replaced by a debugging breakpoint as claimed (“every watchpoint that is hit by `_do_watch` causes a breakpoint to be reached...” on page 40. Further, since “A call to `_do_watch` is patched into the executable prior to each memory access” (page 38), and the patching occurs when the instrumentation breakpoint is reached, then the instrumentation breakpoint inherently becomes a second debugging breakpoint, as every `_do_watch` call causes a breakpoint to be reached.)

Regarding claim 13:

The rejection of claim 1 is incorporated, and further, PMW discloses an instrumentor providing the instrumentation breakpoint and information related to the instrumentation breakpoint as claimed (“a call to `_do_watch` is patched into the executable prior to each memory access.” on page 38. The instrumentation breakpoint is what causes the `_do_watch` function to be patched. Further, an instrumentor would inherently have provided the instrumentation breakpoint so that the patching would occur.)

Regarding claims 14-16:

Art Unit: 2124

Claims 14-16 are directed to a computer-readable medium embodying instructions for performing the methods of claims 11-13, and are rejected for the reasons set forth in connection with claims 11-13.

Response to Arguments

6. Applicant's arguments filed 26 March 2004 have been fully considered but they are not persuasive.

Per claim 1:

The applicants state that PMW does not teach, suggest, or make obvious providing an instrumentation breakpoint in the block of original code or generating the block of instrumented code when the instrumentation breakpoint is reached as in applicants' claim 1. The applicants further state that there is no discussion regarding debugging in conjunction with the original block of code. In response, it is noted that no aspect of claim 1 discusses debugging in conjunction with the original block of code; only a debugging capability which produces a block of instrumented code. As such, the argument that there is no discussion regarding debugging in conjunction with the original block of code is considered moot. Further, PMW discloses providing an instrumentation breakpoint in the block of original code, and generating the block of instrumented code when the instrumentation breakpoint is reached. Note the rejection of claim 1, specifically that "a call to `_do_watch` is patched into the executable prior to each memory access." on page 38. The instrumentation breakpoint is what causes the `_do_watch` function to be patched. This patch is generated into the executable, as stated on page 38, "A post-loader is a program that inserts instrumentation code into executables," thereby ultimately generating an executable with

Art Unit: 2124

instrumented code patched in. As such, PMW discloses providing an instrumentation breakpoint in the block of original code, and generating the block of instrumented code when the instrumentation breakpoint is reached as claimed. Finally, the applicants state that the examiner failed to correspond a breakpoint in PMW to the applicants' debugging breakpoint. However, as noted in the rejection of claim 1, "replacing each store and/or load instructions with an inline check or call to a function that gives control to the debugger if the accessed location is being watched..." (page 37) was intended to indicate the existence of a debugging breakpoint, as if a location is being watched, and the control is passed to the debugger, a debugging breakpoint is inherently reached.) For these reasons, the rejection of claim 1 is considered proper and maintained.

Per claim 2:

The applicants state that PMW does not teach, suggest, or make obvious replacing a first instruction in a block of original code. In response, note the rejection of claim 2, wherein "a call to `_do_watch` is patched into the executable prior to each memory access." on page 38. The instrumentation breakpoint is what causes the patching, and it would inherently replace a first instruction. Not replacing the instruction would cause the instruction to execute twice, once in the patched version, and once in the non-patched version, resulting in the extra execution of an instruction and an error in program operation. As such, PMW discloses replacing a first instruction in a block of original code. For this reason, the rejection of claim 2 is considered proper and maintained.

Per claim 3-5:

Art Unit: 2124

The applicants state that claims 3-5 recite limitations corresponding to claims 1 and 2, and are patentable for at least the same reasons as claims 1 and 2. As indicated above, the rejections of claims 1 and 2 have been maintained, and as such, the rejections of claims 3-5 are maintained.

Per claim 6:

The applicants state that claim 6 recites limitation corresponding to claim 1, and is patentable for at least the same reasons as claim 1. As indicated above, the rejection of claim 1 has been maintained, and as such, the rejection of claim 6 is maintained.

Per claim 7-10:

The applicants state that claims 7-10 recite limitations corresponding to claim 6, and are patentable for at least the same reasons as claim 6. As indicated above, the rejection of claim 6 has been maintained, and as such, the rejections of claims 3-5 are maintained.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be

Art Unit: 2124

calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trent J Roche whose telephone number is (703)305-4627. The examiner can normally be reached on Monday - Friday, 9:00 am - 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (703)305-9662. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Trent J Roche
Examiner
Art Unit 2124

TJR

Kakali Chaki
**KAKALI CHAKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100**